Incidence of Simian Crease in Normal Nepalese Children

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ABSTRACT

Backgroud

Simian crease is usually associated with some chromosomal anomalies and syndromes but it is also seen in some populations without any chromosomal defects.

Objective

To see the incidence of simian crease in children without chromosomal anomalies and to detect the Ethnic group variations.

Methods

A prospective study in children attending the paediatric outpatient department of Manipal Teaching Hospital, Pokhara. –2,067 children were screened randomly from the 1st June 2007 to the 31st December 2007. Palm crease and axial triradius angle were detected in every child. Axial Triradius angle was compared between those who have simian crease to those who do not simian crease.Children who were found with simian crease underwent IQ testing. The exclusion criteria were children with Down syndrome, other chromosomal and minor anomalies, plus or any other chronic disease condition.

Results

2,067children (1,084 boys & 983 girls) were screened. Among them four were cases of Down syndrome so were excluded from the study. Finally total of 2,063 (1,082 boys & 981 girls) were the study group. There were a total 14 ethnic groups who attended the outpatient department of Manipal Hospital during a seven months period. Among the seven ethnic groups Brahaman, Gurung, Tamang, Lama, Newar, Chettri and Dalit had single palmar crease. The incidence of simian crease was14.6%.This incidence was highly significant ($p<0001$) in Lama population (71.2%). In these seven ethnic groups axial triradius angle was compared between those who had simian crease and with those who did not have simian crease. Comparisons were made statistically and found to be significant.

Conclusion

Incidence of simian crease in Nepalese children was 14.6% and was observed only in certain ethnic groups. It was significantly high in the Lama population (71.2%0.

Key Words

Simian crease, single palmer crease, incidence, Down syndrome, ATD angle

INTRODUCTION

A simian crease is a single line that runs across the palm of the hand. People normally have three creases in their palms. A single transverse palmar crease formed by fusion of the proximal and distal palmar creases, a common but not pathognomonic feature of Down syndrome; also found in 1% of the normal population.[1] The simian crease is the most medically researched marker found on the hands because it is the most noticeable. A very high percentage of Down syndrome children have this marker, however, this doesn't does not mean everyone with this marker has Down. Many exceptionally intelligent, highly evolved people have this marker.[2,3] Extensive work has been carried out on several populations, racial, and ethnic groups but there has been no specific documented study for the Nepalese population so far. The objective of this study was to determine the prevalence of simian crease in apparently normal individual of the Nepalese ethnicity residing in Pokhara.

METHODS

A total of 2,067 children (1,084 male and 983 female) from five years to 18 years was screened randomly in the outpatient department (OPD) of Manipal Teaching Hospital, Pokhara over a period of 7 months (1st June 2007–31st December 2007). Four children were excluded from the study as they were cases of Down syndrome. The remaining 2,063 (1,082 males and 981 females) subjects were the focus of the study. They were classified into different ethnic groups. Informed consent was obtained from parents and subjects. Each hand was inspected carefully for simian crease and axial triradius angle (ATD) angle. Observations were categorised into gender and right/left palm(s). All children with simian crease were asked to wash their hands thoroughly and dry them completely. The patient was then asked to put the palm side of his hand on the inked stamp pad and then asked to plant his palm on a clean white non-glazed paper sheet. The resultant pattern 'a'-'d'&'t' triradius was marked with the help of a magnifying glass. With the help of a scale and a protractor, the 'ATD', angle was measured. Data was analysed using Z-test for testing two sample proportions used to find out the statistical significance between the Lama caste and other ethnic groups-Brahamin, Gurung, Tamang, Newar, Chettri, and the Dalits separately. T-test was used to find out the statistical significance between ATD angles with simian crease and ATD angles with no simian crease. In all test p value <0.001 was considered statistically significant.

RESULTS

Out of 2,063 children 1,082 were males and 981 females. When classified into different ethnic groups, there were 14 groups (Table 1) with Bahaman ranking the highest. There were seven ethnic groups namely Brahaman, Gurung, Tamang, Lama, Newar, Chettri and Dalit having simian crease (Table 2). Incidence of simian crease was noted to be 14.6% (302 out of 2063) with confidence interval 95% (13.2%, 16.3%) out of which 54% were male and 46% female (fig.1). Highest number of single palmar crease was observed in the Lama population. Out of 59 Lamas 42 (71.2%) had single palmer crease. This incidence was significantly high with $p<0.002$ when compared with other ethnic groups who had simian crease (table 3). Observation was compared in both palms (right to left) in both sexes (Table 4). It was observed that in males the simian crease was more on the right hand (76%) than in left hand (24%) while in females it was more on the left hand (71%) than in right hand (29%). The ATD angle was compared for ethnic groups who had simian creases with the same ethnic groups who did not have simian crease (Table 5). Ethnic groups Brahamin, Gurung, Lama, Newar, Chettri, Dalit have a statistically significant difference in ATD angles with simian crease and ATD angles with no simian crease. Figure 2 depicts the format used to take the imprint for simian crease and Fig 3 shows the photo and imprint of simian crease.

Table 1. Sex distribution in different ethnic groups (From N=2063 (total), n=302

N=2063	Male	Female	Total
Brahaman	240 (48.0%)	260 (52.0%)	500
Gurung	109 (54.5%)	91 (45.5%)	200
Tamang	24 (58.5%)	17 (41.5%)	41
Magar	29 (58.0%)	21 (42.0%)	50
Lama	32 (54.2%)	27 (45.8%)	59
Newar	167 (55.7%)	133 (44.3%)	300
Chettri	187 (53.4%)	163 (46.6%)	350
Dalit	139 (50.5%)	136 (49.5%)	275
Rai	12 (75.0%)	4 (25.0%)	16
Muslim	14 (63.6%)	8 (36.4%)	22
Thakali	7 (58.3%)	5 (41.7%)	12
Tibeten	14 (50.0%)	14 (50.0%)	28
Pun	48 (48.0%)	52 (52.0%)	100
Madise	44 (55.0%)	36 (45.0%)	80
Other minority groups	16 (53.3%)	14 (46.7%)	30
Total	1082	981	2063

Th incidence of simian crease is 14.6% (302 out of 2063) with confidence interval 95% (13.2%, 16.3%) and male 15.1% (163 out of 1083) with confidence interval 95% (13.0%, 17.4%) and female 14.2% (139 out of 981) with confidence interval 95% (12.1% 16.5%).

Table 2. Ethnic groups having Simian Crease

N=302	Male	Female	Total	percentage
Brahaman (n=500)	44 (48.4%)	47 (51.6%)	91	18.2%
Gurung (n=200)	14 (42.4%)	19 (57.6%)	33	16.5%
Tamang (n=41)	1 (100.0%)	0 (0.0%)	1	2.4%
Lama (n=59)	26 (61.9%)	16 (38.1%)	42	71.2%
Newar (n=300)	19 (54.3%)	16 (45.7%)	35	11.6%
Chettri (n=350)	38 (61.3%)	24 (38.7%)	62	17.7%
Dalit (n=275)	21 (55.3%)	17 (44.7%)	38	13.8%
Total	163 (54%)	139 (46%)	302	

Table 3. Comparison between Ethnic groups

Ethnic groups	P value
Lama (71.2%)	0.0002*
Brahaman (18.2%)	0.0002*
Gurung (16.5%)	0.0002*
Tamang (2.4%)	0.0002*
Newar (11.6%)	0.0002*
Chettri (17.7%)	0.0002*
Dalit (13.8%)	0.0002*

* P value < 0.001 statistically significant

Table 4. Sex and hand (right Vs Left) distribution of Simian Crease in different Ethnic groups

Ethnic group	Simian crease (Male n=163))				Female (139)				Total
	Right		left		Right		Left		
	No.	%	No.	%	No.	%	No.	%	
Brahaman (500)	30	18.4%	14	8.5	7	5	40	28.7	91
Gurung (n=200)	10	6.1	4	2.4	8	5.7	11	7.9	33
Tamang (n=41)	1	0.6	0	0	0	0	0	0	1
Lama (n=59)	20	12.2	6	3.6	8	5.7	8	5.7	42
Newar (n=300)	15	9.2	4	2.4	6	4.3	10	7.2	35
Chettri (n=350)	30	18.4	8	4.9	4	2.8	20	14.4	62
Dalit (n=275)	18	11	3	1.8	7	5	10	7.2	38
Total	124	76%	39	24%	40	29%	99	71%	302

DISCUSSION

A simian crease is a single palmar crease as compared to two creases in a normal palm. Simian crease occurs in about 1 out of 30 normal people, but is also frequently associated with other conditions such as Down syndrome, Aarskog syndrome or fetal alcohol syndrome.[4] The incidence of simian crease in normal Nepalese children was studied. The criteria to be met for normal children in this study was a child who did not have any features of chromosomal anomalies or other anomalies and was free from any chronic illnesses. The incidence of simian crease in normal Nepalese children was 14.6%. About 10% of the Asian population has a simian crease, and studies in the hands of African pygmies have shown percentages close to 30%.[3] In another study by Su C. Oyinbo & H. Fawehinmi the incidence was 4.14%.[5] Simian crease has been implicated in more than twenty human diseases/genetic disorders,[6] including Down's syndrome[7] and in the aetiology of several diseases such as leprosy[8] and cancer,[9] and rheumatoid arthritis.[10] Unlike this finding all the children in this study who were found to have simian crease was normal as all the above mentioned illnesses were exclusion criteria for this study. In this study seven ethnic groups namely Brahman (18.2%), Gurung (16.5%), Tamang (2.4%), Lama (71.2%), Newar (11.6%), Chettri (17.7%) and dalit 13.8%) had Simian crease. Comparable literature for this was not available but the following percentages are represented as indicative for various ethnic populations: Pygmies: 34.7 %, Gypsies: 14.3 %, Chinese: 13.0 %, Koreans: 11.2 %, Kyushu Japanese: 9.2 %, Arabs & Berbers: 7.9 %, Jews: 4.6 %, eastern Japanese: 4.0 %, Germans: 2.8 %, Ainu: 2.2 %, Dutch: 1.5 %, Eskimos: 1.3 %, Swiss: 1.2 %.[11,3] It was observed that 54% males and 46% females had simian crease which was 3.98% and 4.27%[12,] in another study by Tsai FJ, Tsai CH, Peng CT et al .Yet in another study the prevalence of simian crease was 1.8% in male and 2.4% in female of the studied population. The general population prevalence was 4.1%.[5] In this study the episode of simian crease in males was more on the right palm (76%) versus left palm (24%) while in females it was more on the left palm (71%) versus right palm (29%). Unlike this study in some other study simian crease episode did not discriminate between the right and the left palm[5,13] Proximal to each finger an apex a triradius is formed by the dermal ridges by which exact centre of each mount under the finger can be

Table 5. Comparision of ATD angle with and without Simian Crease

Ethnic groups	ATD angles with Simian Crease Mean ± SD	ATD angles with NO Simian Crease Mean ± SD	P value
Brahaman	36.16 ± 3.6	41.77 ± 5.5	0.00*
Gurung	35.82± 3.7	41.76 ± 5.1	0.00*
Lama	36.40 ± 3.6	41.43 ± 5.6	0.00*
Newar	35.46 ± 3.3	42.37± 6.0	0.00*
Chettri	35.29 ± 3.2	41.81± 5.3	0.00*
Dalit	36.24 ± 3.2	41.61 ± 5.7	0.00*

* P value < 0.001 statistically significant

Figure 1. Simian Crease - Imprints and Image

located. These triradii located proximal to the fingers are known as 'a', 'b', 'c' and 'd' triradius starting from the thumb to the little finger respectively. The triradius on the proximal palm in the center is known as 't'. The line joining the 'a', 'd' and 't' triradius forms angles 'atd', 'adt' and 'dat'.[14] In normal being, the 'atd' angle ranges between 40°-45°.[14] In the present study the ATD angle was observed to be around 41-42° in groups with no simian crease and was around 35-36° in groups with simian crease. The ATD angle was compared to ethnic groups who had simian crease with same ethnic groups who did not have simian crease. The 'ATD' angle of groups with no simian crease Brahaman (41.77 ± 5.5), Gurung (41.76 ± 5.1), Lama (41.43 ± 5.6), Newar (42.37± 6.0), Chettri (41.81± 5.3), Dalit (41.61 ± 5.7) respectively was significantly ($p<0.0001$) higher than that of group with simian crease Brahaman (36.16± 3.6), Gurung (35.82± 3.7) Lama (36.40 ± 3.6),) Newar (35.46 ± 3.3). Chettri (35.29 ± 3.2) and Dalit (36.24 ± 3.2) respectively.

CONCLUSION

It can be concluded that everyone with simian crease do not also have Down syndrome. 14.6% of normal Nepalese children have single palmer crease and is present only in certain ethnic groups with incidence being highly significant in the Lama population (71.2%). Further screenings with a larger number of subjects may provide a better incidence.

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